

# PATENT COOPERATION TREATY

From the  
INT'L NATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

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Applicant's or agent's file reference see form PCT/ISA/220		Date of mailing (day/month/year) see form PCT/ISA/210 (second sheet)
International application No. PCT/GB2005/000942	International filing date (day/month/year) 11.03.2005	Priority date (day/month/year) 13.03.2004
International Patent Classification (IPC) or both national classification and IPC H03F1/02		
Applicant FILTRONIC PLC		

### 1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

### 3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Fedi, G Telephone No. +31 70 340-2280	
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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2005/000942

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
 This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:  
 a sequence listing  
 table(s) related to the sequence listing
  - b. format of material:  
 in written format  
 in computer readable form
  - c. time of filing/furnishing:  
 contained in the international application as filed.  
 filed together with the international application in computer readable form.  
 furnished subsequently to this Authority for the purposes of search.
3.  In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

BU<sup>S</sup>  
S<sup>I</sup>  
A<sup>V</sup>  
A<sup>U</sup>  
D<sup>I</sup>  
C<sup>O</sup>  
P<sup>Y</sup>

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)**International application No.  
PCT/GB2005/000942

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**Re Item V****Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

Reference is made to the following document:

D1 : WO 98/26503 A (QUALCOMM INCORPORATED) 18 June 1998 (1998-06-18)

1. Claim 1: document D1, which is considered to represent the most relevant state of the art, discloses in Fig. 4 (the references in parentheses applying to this document):  
A Doherty amplifier comprising: a power splitter having a first output and a second output, wherein the first output is connected to a main power splitter having first and second outputs which differ in phase by 90°; and the second output is connected to an auxiliary power splitter having first and second outputs which differ in phase by 90°;  
a main final stage amplifier comprising first and second main paired amplifiers, the inputs of which are connected to the first and second outputs of the main power splitter;  
an auxiliary final stage amplifier comprising first and second auxiliary paired amplifiers, the inputs of which are connected to the first and second outputs of the auxiliary power splitter;

From this, the subject-matter of independent claim 1 differs in that: the output from the first main paired amplifier is connected to the output from the first auxiliary paired amplifier by an impedance inverter; and the output from the second main paired amplifier is connected to the output from the second auxiliary paired amplifier by an impedance inverter; the amplifier being arranged such that a relative phase shift is introduced to the signals input to the main and auxiliary power splitters to offset the phase shift of the impedance inverters.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT)

The problem to be solved by the present invention may be regarded as providing circuitry for having a Doherty amplifier with stability of the frequency behaviour.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) because none of the documents which are cited in the international search report disclose or suggest said connections between said outputs of main paired and auxiliary paired amplifiers, in order to achieve a compensating frequency effect, i.e. a frequency behaviour stability of the Doherty amplifier.

2. Claims 2-14 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT).

3. Claim 15: document D1, which is considered to represent the most relevant state of the art, discloses in Fig.4 (the references in parentheses applying to this document):

A method of amplifying an input signal, the method comprising: splitting the input signal into a main signal and an auxiliary signal; splitting the main signal into a first main signal and second main signal which differ in phase by 90°; splitting the auxiliary signal into a first auxiliary signal and a second auxiliary signal which differ in phase by 90°; amplifying the first main signal and the second main signal; amplifying the first auxiliary signal and the second auxiliary signal; inverting the impedance of the amplified first main signal; inverting the impedance of the amplified second main signal;

From this, the subject-matter of independent claim 15 differs in that the following additional steps are present:

adding the impedance inverted amplified first main signal to the amplified first auxiliary signal thereby creating a first added signal;

adding the impedance inverted amplified second main signal to the amplified second auxiliary signal thereby creating a second added signal;

wherein a relative phase shift is introduced to the signals during said steps of splitting to offset the phase shift of said steps of inverting.

The subject-matter of claim 15 is therefore novel (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing a method for a Doherty amplifier with stability of the frequency behaviour.

The solution to this problem proposed in claim 15 of the present application is considered as involving an inventive step (Article 33(3) PCT) because none of the documents which are cited in the international search report disclose or suggest said additional steps for treating said main and auxiliary signals, in order to achieve a method for a Doherty amplifier with a stable frequency behaviour.

4. Claims 16, 17 are dependent on claim 15 and as such also meet the requirements of the PCT with respect to novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT).